WHAT IS CLAIMED IS:

1. A device for detecting strain levels imposed on a circuit board, comprising:

an apparatus mounted on the circuit board;

an amplifier for detecting a change in the impedance of the apparatus and generating an output signal representing the change in the impedance of the apparatus; and

a signal conditioner for receiving the output signal and transmitting the output signal to a receiving device for real-time diagnostics.

- 2. The device as defined in claim 1, wherein the apparatus is a non-linear metallic trace.
- 3. The device as defined in claim 1, wherein the apparatus is a trace that is embedded into the circuit board.
- 4. The device as defined in claim 1, further comprising a bridge network coupled to the apparatus and the amplifier.
- 5. The device as defined in claim 1, wherein the apparatus is integrated with the circuit board.
- 6. The device as defined in claim 1, wherein the apparatus is a trace that is integrated with the circuit board.
- 7. The device as defined in claim 1, wherein the signal conditioner includes a plurality of capacitors and a plurality of resistors configured to set the gain of the amplifier.

- 8. The device as defined in claim 1, wherein the apparatus is a strain gage integrated with the circuit board.
- 9. The device as defined in claim 1, wherein the apparatus is a semiconductor chip capable of sensing strains imposed on the circuit board.
- 10. A system for monitoring the strain levels at particular locations on a circuit board located on a vehicle, comprising:

a strain indicator embedded into a layer of the circuit board;

an operational amplifier, mounted on the circuit board, for detecting a change in the resistance of the strain indicator and generating an output signal representing the change in the resistance of the strain indicator; and

a signal conditioner, mounted on the circuit board, for receiving the output signal and transmitting the output signal to a computer located on the vehicle.

- 11. The system as defined in claim 10, wherein the operational amplifier amplifies the output signal by a gain value.
- 12. The system as defined in claim 11, wherein the signal conditioner sets the gain value.
- 13. The system as defined in claim 10, wherein the strain indicator is selected from a group consisting of a S-shaped trace, a single flat grid, a flattened helix or wraparound grid, an equiangular rosette with adjacent elements and a rectangular rosette with layered elements.
- 14. The system as defined in claim 10, wherein the strain indicator is a nonlinear metallic trace.

- 15. The system as defined in claim 10, further comprising a bridge network coupled to the strain indicator.
- 16. A method for monitoring the strain level of a circuit board located on a vehicle, comprising:

performing a vibration analysis on the circuit board to identify at least one position on the circuit board experiencing a relatively large amount of strain during operation of the vehicle;

positioning an apparatus on the circuit board at the at least one position identified by the vibration analysis;

monitoring changes in the resistance of the apparatus using an amplifier;

generating an output signal based on the changes in the resistance of the apparatus; and

transmitting the output signal to a computer on the vehicle.

- 17. The method as defined in claim 16, wherein the apparatus is a trace integrated with the circuit board.
- 18. The method as defined in claim 16, wherein the apparatus is selected from a group consisting of a S-shaped trace, a single flat grid, a flattened helix or wraparound grid, an equiangular rosette with adjacent elements and a rectangular rosette with layered elements.
- 19. The method as defined in claim 16, wherein the apparatus is a semiconductor chip capable of sensing strains imposed on the circuit board.
- 20. The method as defined in claim 16, further comprising amplifying the output signal.